**Goal:** Your task is to investigate how factors, such as surface and weight, affect the size of frictional force.

**Background:** Friction is a force that opposes motion. If you want to drag an object along the floor, you will have to apply a force which is large enough to overcome the frictional force between the floor and the bottom of the object.

* *On a separate tab, write a lab report that includes the following information.*

**Title:** A title that best describes the experiment.

* **Research Question:** What question are you investigating?
* **Hypothesis:** What is your prediction?
* **Material:** You will be given three different surfaces, mass and a Newtonmeter.
* **Procedure:**
* **Part I**
* 1. Draw a Data Table to record the different types of surfaces to be tested and the force needed to pull the block at a constant speed. Note that this data table should be included under the *Data and Calculation section*.
* 2. Place \_\_\_\_\_\_\_ grams in the box with the surface to be tested.
* 3. Attach your newtonmeter to the block.
* 4. Using the newtonmeter, try and pull the block along the surface. Note the force needed to pull the block at a constant speed and record in your Data Table.

5. Repeat steps 2-4 for the other different surfaces.

* **Part II**
* 1. Draw a second Data Table to record the different weights to be tested and the force needed to pull the block at a constant speed. Note that this data table should be included under the *Data and Calculation section*.
* 2. Place \_\_\_\_\_\_\_\_\_ grams on the block with the surface to be tested.
* 3. Attach your newtonmeter to the block.
* 4. Using the newtonmeter, try and pull the block along the surface. Note the force needed to pull the block at a constant speed and record in your second Data Table.
* 5. Repeat steps 2-4, placing different weights on the block.
* 6. Draw an x-y graph showing how the weight placed on the block affects the pulling force in newtons. Note that this graph should be included in the *Results and Analysis section*.
* **Data and Calculation**
* Include any data tables or results from your experiment.
* **Results and Analysis:**
* Use a graph or diagram to show your results.
* Answer the questions in complete sentences.
* 1. Explain what you have discovered about how different surface types affect the size of frictional forces.
* 2. Use your results to explain, as an example, the best braking conditions for a car.
* 3. Explain how changing the weight on the block affected the size of the frictional forces.
* 4. What variable did you need to control in this experiment so that it was a fair test?
* **Conclusion:**
* What conclusion can you form from this? Was your hypothesis correct?
* **Objective:**
* Your task is to investigate how factors, such as surface and weight, affect the size of frictional force.
* **Title:**
* Testing Frictional Force
* **Research Question/Problem:**
* How does the amount of friction affects the roughness of the surfaces and the force that takes the pull?
* **Hypothesis (part 1):**
* If the cork will take the most force to pull,
* **Material:**
* Newton meter
* Blocks
* **Data Table:**
* 1 2 3 Average

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Carpet | 4.0 Newton | 3.8 Newton | 4.5 Newton | 4.1 Newton |
| Cork | 10.0 Newton | 9.0 Newton | 9.8 Newton | 9.6 Newton |
| Plastic | 2.5 Newton | 2.8 Newton | 2.1 Newton | 2.5 Newton |

* **Hypothesis (part 2):**
* If the mass increases then the force will also increase.
* Cork

|  |  |
| --- | --- |
| 1,000 grams | * 10.0 Newton |
| 50 grams | * 1.0 Newton |
| 0 | * Newton |

* **Procedure:**
* *Part I*
* 1. Draw a Data Table to record the different types of surfaces to be tested and the force needed to pull the block at a constant speed. Note that this data table should be included under the *Data and Calculation section*.
* 2. Place \_\_\_\_\_\_\_ grams in the box with the surface to be tested.
* 3. Attach your Newton meter to the block.
* 4. Using the Newton meter, try and pull the block along the surface. Note the force needed to pull the block at a constant speed and record in your Data Table.
* 5. Repeat steps 2-4 for the other different surfaces.
* *Part II*
* 1. Draw a second Data Table to record the different weights to be tested and the force needed to pull the block at a constant speed. Note that this data table should be included under the *Data and Calculation section*.
* 2. Place \_\_\_\_\_\_\_\_\_ grams on the block with the surface to be tested.
* 3. Attach your Newton meter to the block.
* 4. Using the Newton meter, try and pull the block along the surface. Note the force needed to pull the block at a constant speed and record in your second Data Table.
* 5. Repeat steps 2-4, placing different weights on the block.
* 6. Draw an x-y graph showing how the weight placed on the block affects the pulling force in Newton. Note that this graph should be included in the *Results and Analysis section*.
* **Results and Analysis:**
* Answer the questions in complete sentences.
* 1. Explain what you have discovered about how different surface types affect the size of frictional forces.
  + We discovered that in pulling objects in rough surfaces is harder and you will have to exert more force than the others.
* 2. Use your results to explain, as an example, the best braking conditions for a car.
* 3. Explain how changing the weight on the block affected the size of the frictional forces.
* 4. What variable did you need to control in this experiment so that it was a fair test?